

U.S. Serial No. 09/601,790
Attorney Docket No. 46613-00011
Amendment under 37 C.F.R. §1.312

IN THE SPECIFICATION:

Page 1, after the title, please insert the following heading:

FIELD OF THE INVENTION

Page 1, after line 6, please insert the following heading:

BACKGROUND OF THE INVENTION

Please amend the paragraph beginning at page 1, line 15 as follows:

However, thinner films have over-proportionately impaired rigidity in the machine direction and consequently significantly worse machine running behavior, in particular. This is particularly true in today's high-speed wrapping machines. In addition, the barrier properties likewise worsen over-proportionately with the reduction in film thickness. As a consequence of the poorer barrier properties of thin films, the protective action of the film against drying-out and spoilage of the contents is greatly restricted.

Please amend the paragraph beginning at page 1, line 23 as follows:

The increase in the modulus of elasticity (E-modulus) in the machine direction has been the subject of intense efforts for some time since this mechanical property is directly related to the technical suitability and thus determines the processing behavior directly.

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Please amend the paragraph beginning at page 1, line 28 as follows:

The barrier action of BOPP films to water vapor (WVBA) and oxygen (OBA) decreases with the film thickness. In the usual thickness range of BOPP films (from 4 to 100 μm) there is, for example, an approximately hyperbolic relationship between the water vapor barrier (WVBA) and the thickness (d) (WVBA = const.). The constant depends essentially on the raw material composition and the stretching conditions. For BOPP packaging films in accordance with the prior art, the constant has a value of approximately: const. = 28g $\mu\text{m}/\text{m}^2 \text{ d}$. The water vapor permeability here ~~has been~~ was measured in accordance with DIN 53 122.

Please amend the paragraph beginning at page 2, line 2 as follows:

It is known that the modulus of elasticity of BOPP films in the machine direction can be increased either via the process technology or via raw material modifications or through a combination of the two possibilities.

Please amend the paragraph beginning at page 2, line 6 as follows:

The modification of polypropylene films with various hydrocarbon resins is known from the prior art. A raw material modification of this type enables the production of polypropylene films whose mechanical strength in the longitudinal direction is significantly improved compared with films made from unmodified raw materials, but does not achieve the values of films which have been subjected to subsequent longitudinal stretching, and whose shrinkage in the longitudinal direction is likewise relatively high.

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Please amend the paragraph beginning at page 2, line 14 as follows:

~~US-A-4,921,749 (= EP-A-0-247 898)~~ United States patent No. 4,921,749 (EPA 247 898) describes a heat-sealable BOPP film having improved mechanical and optical properties. The heat-sealability of the film and the water vapor and oxygen permeability are likewise improved. All the improvements result from the addition of a low-molecular-weight resin to the base layer. The resin content here is between 3 and 30% by weight. The resin has a molecular weight of significantly less than 5000, preferably less than 1000, and is, for example, 600. The softening point of the resin is from 120 to 140°C.

Please amend the paragraph beginning at page 2, line 23 as follows:

~~EP-A-0 European Patent Application~~ 645 417 describes a biaxially oriented polypropylene film whose n-heptane-insoluble content has a chain isotacticity index, measured by means of ¹³C-NMR spectroscopy, of at least 95%. The base layer contains from 1 to 15% by weight of a natural or synthetic resin which has a softening point of from 70 to 170°C.

Please amend the paragraph beginning at page 2, line 29 as follows:

~~US United States Patent No.~~ 5,155,160 describes the improvement in the barrier properties by the addition of wax to unoriented polypropylene films. The waxes described are paraffin waxes and polyethylene waxes having a molecular weight of from 300 to 800. The barrier action is said to be less than 0.2 g/100 square inches/24 hours.

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Page 3, after line 3, please insert the following heading:

OBJECTS OF THE INVENTION

Please amend the paragraph beginning at page 3, line 5 as follows:

~~The~~ An object of the present invention was is therefore to provide a biaxially oriented polypropylene film which is distinguished by-a good water vapor barrier action and has good mechanical properties. It must be possible to produce the film with reliable running and operation at production speeds of up to 400 m/min. Other physical film properties required in view of their use as packaging film must not be adversely affected. The film should have high gloss, no optical defects in the form of fisheyes or bubbles, good scratch resistance, fault-free running on high-speed packaging machines at low film thickness, and low film haze. In addition, the heat-sealing properties must not be adversely affected.

Page 3, after line 14, please insert the following heading:

SUMMARY OF THE INVENTION

Please amend the paragraph beginning at page 3, line 16 as follows:

This object is achieved by a multilayer biaxially oriented polypropylene film comprising a base layer and at least one heat-sealable top layer, wherein the base layer comprises a combination of resin and wax, and the resin has a mean molecular weight Mw of from 600 to 1500, and the wax has a mean molecular weight Mn of from 200 to 700. ~~The sub-claims indicated preferred embodiments of the invention.~~

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Page 3, after line 21, please insert the following heading:

DETAILED DESCRIPTION OF THE INVENTION

Please amend the paragraph beginning at page 3, line 23 as follows:

According to the present Invention, the The base layer of the film generally comprises at least 85% by weight, preferably from 85 to <100% by weight, in particular from 90 to 95% by weight, in each case based on the base layer, of propylene polymer.

Please amend the paragraph beginning at page 6, line 31 as follows:

It is furthermore essential to the invention that the base layer, in addition to the resin, comprises a wax having an a Mn of from 200 to 700, preferably in an amount of less than 10% by weight, in particular from 1 to 8% by weight, in particular from 1 to 6% by weight, in each case based on the weight of the base layer. For the purposes of the present invention, waxes cover polyethylene waxes and/or macrocrystalline paraffin waxes.

Please amend the paragraph beginning at page 10, line 32 as follows:

If desired, the additives described above for the base layer, such as antistatics, neutralizers, lubricants, and/or stabilizers, and, if desired, additionally additional antiblocking agents, can be added to the top layer(s). The figures in % by weight then relate correspondingly to the weight of the top layer.

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Please amend the paragraph beginning at page 11, line 2 as follows:

Suitable antiblocking agents are inorganic additives, such as silicon dioxide, calcium carbonate, magnesium silicate, aluminum silicate, calcium phosphate and the like, and/or incompatible organic polymers, such as polyamides, polyesters, polycarbonates and the like, preference being given to benzoguanamine-formaldehyde polymers, silicon dioxide and calcium carbonate. The effective amount of antiblocking agent is in the range from 0.1 to 2% by weight, preferably from 0.1 to 0.8% by weight. The mean particle size is between 1 and 6 μm , preferably between 2 and 5 μm , with particles having a spherical shape, as described in EP-A-0 European Patent Application 236 945 and DE-A- German Patent Application 38 01 535, being particularly suitable.

Please amend the paragraph beginning at page 11, line 28 as follows:

The overall thickness of the polypropylene film according to the invention can vary within broad limits and depends on the intended use. ~~#~~ The thickness is preferably from 4 to 60 μm , in particular from 5 to 30 μm , preferably from 6 to 25 μm , the base layer making up from about 40 to 100% of the total film thickness.

Please amend the paragraph beginning at page 13, line 24 as follows:

For flame treatment with a polarized flame (see US-A- United States Patent No. 4,622,237), a direct electric voltage is applied between a burner (negative pole) and a chill roll. The level of the applied voltage is between 400 and 3000 V, preferably in the range from 500 to 2000 V. The applied voltage gives the ionized atoms increased acceleration, and they hit the polymer surface with greater kinetic energy. The chemical

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bonds within the polymer molecule are broken more easily, and formation of free radicals proceeds more rapidly. The thermal load on the polymer is much less here than in the case of standard flame treatment, and films can be obtained in which the heat-sealing properties of the treated side are even better than those of the untreated side.

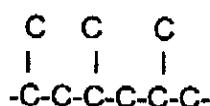
Please replace the paragraphs beginning at page 17, line 10 through page 18, line 15 with the following paragraphs:

Case B:

In the ^{13}C -NMR spectrum of an ethylene-propylene copolymer, the chemical shift of the methyl groups of interest is in the range from 19 to 22 ppm. The spectrum of the methyl groups can be divided into three blocks. In these blocks, the CH_3 groups appear in triad sequences, whose assignment to the local environment is explained in detail below:

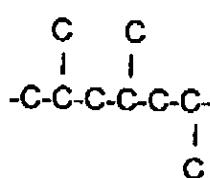
Block 1:

CH_3 groups in the PPP sequence (mm triad)



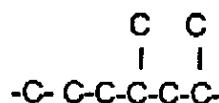
Block 2:

CH_3 groups in the PPP sequence (mr or rm triad)



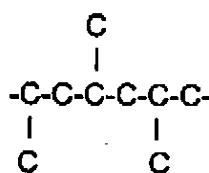
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and CH₃ groups in the EPP sequence (m chain):

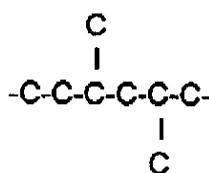


Block 3:

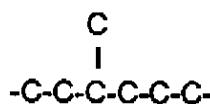
CH₃ groups in the PPP sequence (rr triads):



CH₃ groups in an EPP sequence (r chain):



CH₃ groups in an EPE sequence:



Please amend the paragraph beginning at page 19, line 18 as follows:

A. Zambelli, G. Gatti, C. Sacchi, W.O. Crain, Jr., and J.D. Roberts,
Macromolecules, 4, 475 (1971)